

SYLLABUS OF SEMESTER SYSTEM  
FOR THE TRADE OF

# **MECHANIC (MOTOR VEHICLE)**

UNDER

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)  
(ONE YEAR/TWO SEMESTERS)

REDESIGNED IN  
2014

BY  
GOVERNMENT OF INDIA  
MINISTRY OF LABOUR & EMPLOYMENT (DGE&T)

## GENERAL INFORMATION

1. Name of the Trade : MECHANIC (MOTOR VEHICLE)
2. Duration : One year (Two semester )
3. Power Norms : (a) Class Room : 1 kw  
(b) Workshop : 5 .kw
4. Space Norms : (a) Class Room : 30 Sq. Mt. (@ 1.5 Sq.Mt. per Trainee)  
(b) Workshop : 120 Sq. meter. + 240 Sq. M(Parking Area)
5. Entry Qualification : NTC& NAC in Mechanic Motor Vehicle or Mechanic Auto Electrical and Electronics  
Or  
Diploma/Degree In Mechanical / Automobile Engg.  
  
Valid MCWG & LMV driving License Mandatory for all
7. Unit strength : 20 Trainees
8. Trainer's Qualification: Engineering Degree in Automobile or Mechanical  
OR  
Diploma in Automobile or Mechanical with 3 Years Experience .  
Or  
NTC & NAC in Mechanic Motor Vehicle Trade With 2 Years Of Experience  
  
CITS course in Mechanic Motor Vehicle trade and Valid MCWG & LMV driving License Mandatory for all.

### **Distribution of training on Hourly basis:**

Semester	Total hours /week	Trade practical	Trade theory	POT	Engg. Drawing	Wksp/sc calculation
I	40 Hours	20 Hours	5 Hours	--	06 hours	09 hours
II	40 Hours	20 Hours	5 Hours	15 Hours	--	--

**SYLLABUS FOR TRADE OF MECHANIC MOTOR VEHICLE**

**FIRST SEMESTER (Semester Code.:        )**

**Duration : 06 Months**

**SYLLABUS FOR TRADE TECHNOLOGY –I**

<b>WEEK NO.</b>	<b>TRADE PRACTICAL</b>	<b>TRADE THEORY</b>
<b>1</b>	<p>Practice 5s techniques in the automobile work shop.</p> <p>Practice 7QC techniques in the automobile work shop.</p> <p>Precautions to be observed while working in the automobile work shop and garage equipments.</p> <p>Familiarization with computer, Practice on data base creation with MS access and data base application.</p>	<p>Admission, introduction, facility available in the institute.</p> <p>Importance of safety, safety precautions &amp; first aid.</p> <p>Concept of 5S &amp; 7QC tools, time management as employed for quality circle. Importance of healthy environment.</p> <p>Application of computers &amp; its Features. Physical &amp; logical concept of data base.</p> <p>Disposal of automotive waste</p>
<b>2</b>	<p>Handling &amp; maintenance of hand tools, special tools, equipments &amp; machineries.</p> <p>Maintenance of garage equipments in the workshop.</p> <p>Preventive maintenance of vehicle/engines.</p>	<p>Application and safety to be observed while handling hand tools, special tools, equipments &amp; machineries</p> <p>Importance and types of maintenance of vehicles/engines.</p> <p>Safely handling of hazardous materials</p>
<b>3</b>	<p>Checking engine vacuum &amp; compression pressure.</p> <p>Taking Cylinder leakage test with compressed air.</p> <p>Measure the cubic capacity of an given engine.</p>	<p>Explanation of Principle of All types of SI and CI Engines with respect to pressure, volume and temperature.</p> <p>Thermodynamic cycles with respect to pv &amp; ts diagrams.</p> <p>Valve timing diagram of all types of Engine</p>
<b>4 &amp; 5</b>	<p><b>Servicing cylinder head assembly</b></p> <p>Remove all accessories attached with the engine dismantling the head components and its visual inspection-</p> <p>Measuring components for wear with precision measuring instruments-suggestions for remedy and taking remedial measures.</p> <p>Reassembling cylinder head components.</p>	<p>Importance of servicing cylinder head-</p> <p>Precautions to be observed while servicing cylinder head.</p> <p>Reasons for frequently occurring abnormal wear in cylinder head components and its Effects on engine performance.</p> <p>Constructional details, Advantages and disadvantages of variable valve timing</p>

<p><b>6 &amp;7</b></p>	<p><b>Servicing cylinder block assembly</b>          Removing and dismantling piston and connecting rod assembly, crank shaft and flywheel, vibration damper from the engine.</p> <p>Visual inspection of cylinder block for various parameters such as bore, main journal etc. for wear and suggest remedial measures.</p> <p>Visual inspection of the cylinder blocks components (piston and connecting rod assembly, crank shaft, flywheel etc.)</p>	<p>Importance of servicing cylinder block-          Precautions to be observed while servicing cylinder block.</p> <p>Reason for measuring cylinder block for various parameters to find out its serviceability and suggestions for remedial measures.</p> <p>Reasons for frequently occurring abnormal wear in cylinder block components and its Effects on engine performance.</p>
<p><b>8&amp;9</b></p>	<p>Measuring cylinder block &amp; components for wear with precision measuring instruments- suggestions for remedy and taking remedial measures.</p> <p>Reassembling the engine block and its components.</p> <p>Refit cylinder head assembly.</p> <p>Setting valve timing.</p> <p>Checking and setting valve clearance</p> <p>Practice on checking and setting variable valve timing</p>	<p>Importance of measuring cylinder blocks components for actual wear to decide serviceability.</p> <p>Engine assembly procedure as recommended by manufacturers.</p> <p>Importance and correct procedure of setting valve timing</p> <p>Importance of correct valve clearance</p> <p>Precautions to be observed while assembling engine components.</p>
<p><b>10&amp;11</b></p>	<p><b>Maintenance, diagnosis and Servicing intake systems</b>          Servicing of different types of air cleaner, turbocharger, intercooler, throttle body, intake manifold</p> <p><b>Maintenance, diagnosis and Servicing exhaust systems</b>          Servicing of exhaust manifold, catalytic converter, resonator, muffler</p>	<p>Study about intake system components such as air cleaner, different types of turbo charger, super charger, throttle body, intake manifold etc.</p> <p>Importance of maintenance, diagnosis and Servicing intake systems.</p> <p>Causes of failure of the components of intake system.</p> <p>Trouble shooting in an intake system.</p> <p>Study about exhaust system components such as exhaust manifold, muffler, types of catalytic converter etc.</p> <p>Importance of maintenance, diagnosis and Servicing exhaust systems.</p> <p>Causes of failure of the components of exhaust system.</p> <p>Trouble shooting in an intake system.</p>
<p><b>12</b></p>	<p><b>Maintenance, diagnosis and servicing of basic petrol fuel system components</b>          Overhauling of fuel tank, mechanical fuel Pump, electrical pump, fuel filters, carburetors          Testing of fuel pumps for proper functioning.</p>	<p><b>FUEL SUPPLY SYSTEM IN PETROL ENGINE</b>          Gasoline Fuel: properties of Gasoline fuel – combustion processes</p> <p>Study about carburetor fuel system and its components such as fuel tank, mechanical fuel Pump, electrical pump, fuel filters, carburetors and its circuits etc.</p>

		<p>Importance of maintenance, diagnosis and Servicing carburetor fuel system and its components.</p> <p>Causes of failure of the carburetor fuel system and its components.</p> <p>Trouble shooting in carburetor fuel system and its components.</p> <p>Importance of testing of fuel pumps.</p>
<b>13&amp;14</b>	<p><b>Maintenance, diagnosis and servicing of conventional diesel fuel system and its components.</b></p> <p>Overhauling of fuel tank, fuel feed Pump, electrical pump, fuel filters, types of fuel injection pumps, governors, injector</p> <p>Testing of fuel feed pumps for proper functioning.</p> <p>Servicing of fuel tanks, Checking leaks in the fuel lines, draining of water separators.</p> <p>Replacing of primary&amp; secondary filters.</p> <p>Phasing and calibration of fuel injection pump.</p> <p>Testing of injectors for its proper functioning.</p> <p>Setting fuel injection timing</p> <p>Bleeding diesel fuel system.</p>	<p>FUEL SUPPLY SYSTEM IN DIESEL ENGINES</p> <p>Diesel fuel &amp; its properties – combustion processes</p> <p>Study about conventional diesel fuel system and its components such as fuel tank, fuel feed Pump, electrical pump, fuel filters, water separators, fuel injection pumps, governors, injectors etc.</p> <p>Importance of maintenance, diagnosis and Servicing diesel fuel system and its components.</p> <p>Causes of failure of the diesel fuel system and its components.</p> <p>Importance of testing of fuel feed pumps, FIP and injectors.</p> <p>Importance of setting correct FIP timing.</p> <p>Importance of bleeding the fuel system.</p> <p>Trouble shooting in diesel fuel system and its components.</p>
<b>15&amp;16</b>	<p><b>Maintenance, diagnosis and servicing of lubrication system.</b></p> <p>Changing engine oil and filter.</p> <p>Tracing oil leak from the engine.</p> <p>Overhauling of oil pump,</p> <p>Checking oil pressure relief valves for proper functioning.</p> <p>Servicing oil coolers.</p> <p>Checking oil galleries</p> <p>Oil pressure testing.</p> <p>Removing of sludge by using flushing oil.</p>	<p>ENGINE LUBRICATION SYSTEM</p> <p>Lubricant, types, application and its properties.</p> <p>Study about lubrication systems and its components such as oil sump, oil strainer, oil pump, relief valve, filter, bypass valve, oil cooler etc.</p> <p>Study about oil filtering systems.</p> <p>Importance of maintenance, diagnosis and Servicing lubricating system and its components.</p> <p>Causes of failure of the lubricating system and its components.</p> <p>Importance of testing of oil pumps.</p> <p>Importance of servicing oil filter.</p> <p>Importance of checking and setting correct oil pressure.</p> <p>Reasons for sludge formation and its prevention</p> <p>Trouble shooting in lubricating system and its components.</p>

17&18	<b>Maintenance, diagnosis and servicing of cooling system</b> Flushing cooling system Replacing coolant. Tracing coolant leakage from the engine. Checking cooling system for proper functioning. Replacing/Overhauling of water pump. Checking thermostat valve. Adjusting fan belt tension. Checking radiator pressure cap for proper functioning. Replacing/Serviceing radiator. Diagnosis of improper operating temperature.	<b>ENGINE COOLING SYSTEM</b> Coolant, types, and its properties. Importance of maintaining correct coolant-water ratio. Study about cooling systems and its components such as radiator, pressure cap, types of hoses, types of water pump, electric fan, thermostat, fan belts, temperature gauge, temperature sensor etc. Study about oil filtering systems. Importance of maintenance, diagnosis and Serviceing cooling system and its components. Causes of failure of the cooling system and its components. Importance of testing of pressure cap. Importance of serviceing radiator. Trouble shooting in cooling system and its components.
19	Industrial visit/ in plant training / project work	
20	<b>Maintenance, diagnosis and servicing battery</b> Checking of battery condition using hydrometer and battery tester. Charging batteries in series and parallel. Maintenance of battery. Jump starting a battery. Preparation of electrolyte. Reconditioning of terminal post.	Battery/accumulator :- types, construction, working .Battery capacity &rating, Booster starting. IBS, Disposal of waste battery. Advantages of slow charging. Advantages of solidification of electrolyte by adding salicylic acid or introducing absorbed glass mat (AGM )-VRLA battery Electrolyte-definition, percentage of sulphuric acid and water. effects of improper ratio of acid and water on battery life. specific gravity of water, acid and electrolyte. Temperature effect on specific gravity. Battery troubles and their remedies
21	<b>Maintenance, diagnosis and servicing of starting system</b> Checking starter circuit for proper functioning. Checking solenoid switches for proper functioning Overhauling all types of starter. Checking of starter for proper functioning.	Study about starting system and its components. Importance of checking starter circuit for proper functioning. Role of solenoid switch and relay, importance of its checking. Importance of testing starter components. Troubles and remedies in starting system.
22	<b>Maintenance, diagnosis and servicing of charging system</b> Checking charging circuit voltage drop test for proper functioning. On vehicle inspection of alternator for proper functioning. Overhauling of alternator Testing voltage regulator.	Study about Charging system and its components Importance of checking charging circuit for proper functioning. Importance of voltage regulation Importance of testing charging system components. Troubles and remedies in charging system.

23	<p><b>Maintenance, diagnosis and servicing of conventional ignition system</b>          Checking ignition circuit for proper functioning.</p> <p>Checking magneto coil for proper functioning.          Checking magneto for proper strength.          checking and Setting of magneto ignition timing using Ignition Timing light.</p>	<p>Study about types of conventional Ignition system and its components.          Importance of checking ignition circuit.          Importance of checking and setting correct ignition timing</p>
24	<p>Overhauling distributor.          Checking vacuum &amp; centrifugal advance mechanism for proper functioning.          Testing ignition coil, spark plug, condenser for proper functioning using testing equipment.          Setting ignition timing. Checking of Ignition timing using Ignition Timing light</p>	<p>Study about distributor and its components.          Importance of checking distributor for proper functioning.          Importance of testing ignition coil, spark plug, condenser for proper functioning.          Common troubles in Ignition system.</p>
25	<p>Checking of exhaust gas in petrol engine using exhaust gas analyser.          Checking of exhaust gas in diesel engine using Smoke meter.          Maintenance of crank case ventilation system.          Maintenance of EGR system.</p>	<p><b>EMISSION CONTROL SYSTEM.</b>          Definition, Sources of emission (such as Exhaust system, crank case, fuel tank and carburetor) .          Methods to control emission,( 1. exhaust system with EGR OR Air injection system in to exhaust manifold with catalytic converter 2. Positive crank case ventilation. 3. Evaporative control system ie charcoal canister. ). Vehicle emission standards- Euro and Bharat standards. Emission control</p>
26	REIVISION & TEST	

**SYLLABUS FOR TRADE OF MECHANIC MOTOR VEHICLE**

**SECOND SEMESTER (Semester Code.:        )**

**Duration : 06 Months**

**SYLLABUS FOR TRADE TECHNOLOGY –I I**

Week no	TRADE PRACTICAL	Trade THEORY
1&2	Trouble tracing in lighting system, Head light alignment. Trouble tracing in digital dashboard gauges. Horn circuit, servicing of horn. Servicing of wiper motor, flasher circuit, Power window, power mirror. Testing body control module(BCM) using can communication system	Lighting system and its accessories:- Function, lay out, working of all circuits. Dazzling of lights. Lights used in automobiles. Head lights, LED lights, HID lights, Light circuit and switches Digital panel board gauges and their circuit Power mirror, CAR stereo, Intelligent parking assisting system, Blue tooth and GPS/GPRS assisted navigation system. Horn and horn relay circuit, Wiper motor and its circuit, Power window and its circuit, Flasher unit and its circuits CAN BUS (CONTROLLER AREA NETWORK) networking system. ( history, definition ,and advantages ) Study about the schematic and routing diagram of BCM
3&4	Engine petrol diagnostic information and procedures-Engine and emission control system-analyzing the complaint-handling of scan tool-checking freeze frame data- recording freeze frame data and clearance- visual inspection-confirmation of trouble system- rechecking freeze frame data	Precautions to be observed while working with engine emission control systems-details of OBD-description of data link connector- study about schematic and routing diagram of emission control system-flow diagram of control systems-terminal arrangement of ECM
5	Trouble shooting for DTC( <b>Diagnostic                      Trouble Code</b> )-checking DTC circuits- identifying the trouble by scan tool-tracing the faults by trouble code-checking intermittent problems-final confirmation test	Details of trouble codes-functions of sensors and actuators-details of scan tool-precautions while working with sensors and actuators



<p><b>6</b></p>	<p>Identification of various components of MPFI system.          Servicing of petrol injector          Checking of ECU, for proper functioning.          Checking of fuel pump for proper functioning.          Checking fuel pressure regulator.          Checking various types of sensors.</p>	<p>Electronic Fuel Injection (EFI) system-Function, types, construction and working of EFI system. Advantages &amp; disadvantages of Throttle body fuel injection system or SPFI &amp; MPFI system,          Function, types, construction, working of components of EFI system such as Electronic control unit (ECU), fuel tank, fuel line, fuel pump, fuel filter, fuel rail, fuel pressure regulator, fuel injector, idle air control valve, throttle body, relays, sensors.</p>
<p>7</p>	<p>Servicing CRDI fuel system: checking low pressure fuel supply circuit-preliminary check-checking fuel pump operation-checking fuel pressure-checking high pressure fuel supply circuit-checking fuel injector leak-checking fuel regulator</p>	<p>Precautions to be observed before removing the CRDI fuel system-study about the low and high pressure fuel supply circuits</p>
<p><b>8</b></p>	<p>Removing a CRDI pump from an engine-refit the pump to the engine. start and adjust slow speed of the engine.          Overhauling of various types of injectors.          Testing of various types of injector.          Checking and replacing the components of CRDI system.</p>	<p>Electronic Diesel control-          Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system, Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system.          Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines.</p>
<p><b>9</b></p>	<p>Find out the location of CNG kit components in vehicle.          Overhauling of CNG kit components. (conventional type)          Overhauling of CNG kit components. (Gas injection type)          Find out the location of L P G kit components in vehicle.          Overhauling of L P G kit components.          Maintenance, diagnosis and servicing of electric and hybrid car</p>	<p>ALTERNATIVE FUELS, TYPES, PROPERTIES, Advantages &amp; disadvantages of each type of fuel.          CNG engine and its advantages.          CNG conversion kit, function, constructional details. (conventional type)          CNG conversion kit, function, constructional details. (Gas injection type)          L P G engine and its advantages.          L P G Conversion kit, function, constructional details.          Comparison between diesel, LPG and CNG.          Electric car and Hybrid car.</p>

10	<p>Determining the mechanical efficiency of the engine by Morse test using dynamometer and tachometer.</p> <p>Determining air consumption, lubricating oil consumption.</p>	<p><b>ENGINE PERFORMANCE TESTS</b>  Purpose of testing an I.C engine. Classification of tests, fault finding tests, Routine tests. Measurement of IHP, Indicative mean effective pressure, BHP Mechanical efficiency, Fuel consumption, Thermal efficiency, Volumetric efficiency, relative efficiency, Air Consumption, Lubricating oil consumption. Dynamometers and its types.</p>
11	<p><b>MAINTENANCE, DIAGNOSIS AND SERVICING OF TRANSMISSION SYSTEM</b>  IDENTIFICATION OF COMPONENTS SYSTEM AND TYPES OF DRIVE.  IDENTIFICATION OF COMPONENTS OF TRANSMISSION SYSTEM &amp; ITS LOCATION.  ADJUSTMENT OF CLUTCH PEDAL PLAY.  OVERHAULING OF DIFFERENT TYPES OF CLUTCH ASSEMBLY.  Overhauling of hydraulic clutch master cylinder &amp; slave cylinder.</p>	<p><b>TRANSMISSION SYSTEM</b>  Definition, function, Layout and working of transmission system. Torque tube drive and Hotchkiss drive.  Components of transmission system:-  <b>CLUTCH</b> :-Function, types, construction, working of each type such as single plate coil spring &amp; diaphragm spring clutch, multi plate dry &amp; wet clutch, centrifugal clutches, Fluid coupling, Torque converter. Common troubles and remedies in clutches.</p>
12	<p>Overhauling of constant mesh gear box.  Overhauling of synchromesh gearbox  Calculating gear ratio  Overhauling of transaxle assembly  Overhauling of automatic transmission assembly.</p>	<p><b>GEAR BOX:-</b> Function, types, construction, working of each type such as Sliding mesh, constant mesh, synchromesh, transaxle, Automatic transmission-Planetary gearbox, Dual shift gearbox and CVT (continuously variable transmission) Gear box, fluid fly wheel, torque converter, gear ratios.  Troubles, causes and remedies in gear box</p>
13	<p>Overhauling of universal joint assembly.  Overhauling of different CV joints.  Overhauling of rear axle assembly.  Dismantling of final drive gears, differential gears, inspecting tooth wear, adjusting back lash, preloading reassembling.</p>	<p><b>UNIVERSAL JOINT:-</b> Function, types, construction, working of each type.  Types of CV joints.  <b>PROPELLER SHAFT &amp; SLIP JOINT:-</b> Function, types, construction, working.  <b>DIFFERENTIAL AND REAR AXLE :-</b> Function, types. Construction, and working.  Troubles, causes and remedies in rear wheel drive.</p>
14	<p>Checking and replacing of bearings, removing of wheel bearings, cleaning, checking, replacing, pre loading, assembling of rear axle and adjusting the wheel bearings)  Overhauling transfer case.</p>	<p><b>FOUR WHEEL DRIVE:-</b> Function, Construction, and working.  Comparison between four wheel and all wheel drive.  <b>TRANSFER CASE:-</b> Function, Construction, and working.  Common troubles and remedies in transmission system</p>

15	<p>Overhauling of shackle, leaf springs of front rear suspension.</p> <p>Overhauling of macpherson suspension system.</p> <p>Overhauling of coil spring suspension system.</p> <p>Removing and checking of different types of shock absorber.</p>	<p><b>SUSPENSION SYSTEM</b></p> <p>Conventional suspension system-Description and function of different types of leaf spring, coil spring, Torsion bar and rubber spring.</p> <p>Front and rear Independent suspension systems, Air suspension system, Gas pressurized shock absorber.</p> <p>Comparison of independent and rigid axle suspension system.</p> <p>Common troubles and remedies in suspension system</p>
16	<p>Checking of front axle for twist and bend.</p> <p>Removing wheel from light &amp; heavy vehicles.</p> <p>Checking of puncture in tube &amp; tubeless tyres.. Checking wheel balance. tyre rotation.</p>	<p>Front axle :-Function types, construction, Types of stub axles</p> <p>Wheels &amp;Tyres description, function and types. run flat tyres. Types of rim assembly, Ply rating, tyre rotation, Necessity of Inflation pressure, Tyre sizes and designations, tyre retreading, tyre tread patterns and wheel balancing common troubles in wheels &amp;Tyres.</p>
17	<p>Calculating steering gear ratio</p> <p>Inspect and adjust the steering wheels with respect to front wheels.</p> <p>Inspect and overhaul different types of manual steering gearboxes,</p>	<p>Steering system- functions, types of steering linkages, constructional details of different types of manual steering gearboxes.</p> <p>Function of ball joint, fixed and variable steering gear ratios.</p> <p>Description of collapsible steering column</p>
18	<p>Adjusting steering gear backlash and end play. Check and adjust toe-in, camber, king pin inclination, castor angle and included angle.</p> <p>Checking &amp; adjusting power steering fluid, Pressure testing a power steering system, Flushing a power steering system</p> <p>Overhauling of power steering pump and gear box.</p>	<p>Description and function of Ackerman steering mechanism.</p> <p>Details of steering geometry</p> <p>Power steering –Hydraulic, electric and electronic and its types.</p> <p>Importance of Maintenance of steering column and linkages.</p> <p>Importance of maintenance of power steering gear.</p> <p>Common troubles and remedies in steering system</p>
19	<p>Overhauling of front and rear brake assembly.</p> <p>Overhauling of master cylinder&amp; wheel cylinder.</p> <p>Overhauling of disc brake assembly.</p> <p>Adjusting brake pedal free play.</p> <p>Bleeding hydraulic brake system-manual, vacuum and pressure bleeding.</p>	<p><b>BRAKE SYSTEM</b></p> <p>Function, types, lay out, working of all brake system.</p> <p>Components of hydraulic brake system:-function, types, construction and working of master cylinder, wheel cylinder, Drum brake , disc brake, Brake lining, Brake shoe and brake fluid. Parking brake, exhaust brake and retarder. Minimum stopping distance. Types</p>

		of bleeding methods.
20	Overhauling components of power assisted hydraulic brake system. Servicing of vacuum pump mounted in alternator. Adjusting a parking brake cable.	Components of Air assisted hydraulic brake:- Function, working of all components such as air compressor, air booster, air valve, air tank along with the components of hydraulic brake system Components of Vacuum assisted hydraulic brake:-Function, working of all components such as vacuum booster, vacuum valve, vacuum pump/vacuum tank along with the components of hydraulic brake system.
21	Adjusting Air brakes- repair to tank unit, air compressor, wheel brake adjuster- locating air leaks in the brake lines and rectifying. Servicing all air brake components. Testing brakes with brake testing equipment Balancing all four wheel brakes. precautions to be observed while testing brakes	components of fail safe air brake system:- Function, types, construction and working of air brake system such as air compressor, air filter, unloader valve, air tank, brake valve, flick valve, front spring brake chamber, rear spring brake actuator, brake shoe, brake liner, system protection valve and slack adjuster
22	Maintenance, diagnosis and servicing of antilock brake system. Diagnosing wheel speed sensor problems.	Antilock braking system- Principles, operation and components of Antilock braking system, ABS master cylinder, Hydraulic control unit, Wheel speed sensors, Antilock braking system(ABS )with EBD (electronic brake distribution) unit. Traction control system. Importance of Brake testing and common troubles in braking system
23	PROJECT WORK/ INDUSTRIAL VISIT/INPLANT TRAINING/DRIVING PRACTICE.	
24	Checking performance of air conditioning system. Checking charged state of refrigerant. charging of refrigeration system. Diagnosis abnormal noise and rectifying it.	<b>Heating, Ventilation and Air Conditioning system</b> Basic principles of air conditioning system, components of air conditioning system in motor vehicle description and function. Types of refrigerants. Common troubles and remedies of air conditioning system.
25	Maintenance and diagnosis of supplementary restraint system(SRS) such as Checking of air bags, Crash sensors, seat belt pre-tensioners, Tire pressure monitoring system, Vehicle tracking system, Vehicle security systems, immobilizer system, Central locking system, Car alarms for proper functioning.	<b>Vehicle safety system</b> Description and function of air bags, working principle of air bags, Crash sensors, seat belt pre-tensioners, Tire pressure monitoring system, Vehicle tracking system, Vehicle security systems, immobilizer key, Central locking system, Car alarms
26	REVISION AND FINAL EXAMINATION	

**TRADE: MECHANIC (MOTOR VEHICLE)**

**LIST OF TOOLS & EQUIPMENT**

**First & second semesters.**

**A. TRAINEE TOOLKIT FOR 20 TRAINEES +1 INSTRUCTOR**

SL.NO	ITEM WITH SPECIFICATION	QTY
<b>Trainees tool kit (10 Trainees +1 Instructor)</b>		
1.	Steel rule 150 mm(graduated both English and metric) as per IS 1481	10+1 nos.
2.	Steel rule 300 mm(graduated both English and metric) as per IS 1481	10+1 nos.
3.	Steel measuring tape 10 meter in a case	10+1 nos.
4.	Engineers Try Square 150 mm with knife edge as per IS 2013	10+1 nos.
5.	Outside Caliper 15 cm spring type	10+1 nos.
6.	Inside Caliper 15 cm Spring type	10+1 nos.
7.	Dividers 15 cm Spring type	10+1 nos.
8.	Safety glasses	10+1 nos.
9.	Scriber 15 cm	10+1 nos.
10.	Knife double Blade Electrician	10+1 nos.
11.	Wire insulation Stripper for shinning conductors from 0.4mm to 4mm	10+1 nos.
12.	Electrician testing Pencil (Line / Neon tester)	10+1 nos.
13.	Electrician Screw Driver 250mm	10+1 nos.
14.	Centre punch 10 cm.	10+1 nos.
15.	Chisel cold flat 20 mm x 150 mm	10+1 nos.
16.	Hammer ball peen 0.5 kg with handle	10+1 nos.
17.	Screw driver 20cm.X 9mm. Blade	10+1 nos.
18.	Screw driver 30 cm. X 9 mm. Blade	10+1 nos.
19.	Spanner D.E. set of 12 pieces (6mm to 32mm) as per IS2028	10+1 nos.
20.	Combination Pliers 20 cm.	10+1 nos.
21.	Side cutting Pliers 15 cm	10+1 nos.
22.	Round nose Pliers 15 cm	10+1 nos.
23.	Flat nose Pliers 15 cm	10+1 nos.
24.	Hand file 20 cm. Second cut flat	10+1 nos.
25.	Hand file 20 cm. Second cut half-round	10+1 nos.
26.	Hand file 20 cm. smooth triangular	10+1 nos.

27.	Hand file 30 cm. bastard	10+1 nos.
28.	Hand file 30 cm. round bastard	10+1 nos.
29.	Ring spanner set of 12 pieces(6mm to 32mm)	10+1 nos.
30.	Feeler gauge 20 blades(metric)	10+1 nos.
31.	File card or cleaner	10+1 nos.
32.	Wire cutter and stripper	10+1 nos.
33.	Allen key set of 12 pieces(2mm to 14 mm)	10+1 nos.
34.	Steel tool box with lock and key (folding type) 400x200x150 mm	10+1 nos.
35.	Punch Letter 4mm	10 +1 nos.

### **Tools, Instruments and General shop outfits**

1.	Outside micrometer 0 to 25 mm with least count 0.010mm as per IS 2967	2 nos.
2.	Outside micrometer 25 to 50 mm with least count 0.010mm as per IS 2967	2 nos.
3.	Outside micrometer 50 to 75 mm with least count 0.010mm as per IS 2967	2 nos.
4.	Outside micrometer 75 to 100 mm with least count 0.010mm as per IS 2967	2 nos.
5.	Inside micrometer 25 -50,50-75,75-100,100-125,125-150mm, with least count 0.01mm	2 each
6.	Depth micrometer 0-25mm with least count 0.010mm	2 nos.
7.	Thread Micrometer 0-25mm with least count 0.010mm	2 nos.
8.	Adjustable micrometer spirit level to measure flatness, indication and taper with prismatic measuring base	2 nos.
9.	Vernier caliper 200mm inside and outside (graduated in inches and millimetres)	1no.
10.	Digital Vernier calliper outside 300mm least count 0.01mm	2 nos.
11.	Vernier depth Gauge 0-150 mm	2 nos.
12.	Vernier bevel protractor, least count 5minutes as per IS 4239	2 nos.
13.	Telescope gauge	2 nos.
14.	Dial test indicator plunger type (complete with clamping devices and stand)	4 nos.
15.	Universal Surface gauge	2 nos.
16.	Cylinder bore gauge capacity 20 to 160 mm	2 nos.
17.	Compression testing gauge suitable for petrol engine.	2 nos.
18.	Vacuum gauge to read 0 to 760 mm of Hg.	2 nos.

19.	Granite surface plate ,Grade 0,630 x 630 x 100 mm with adjustable stand as per IS7327	1 no.
20.	Calipers 15 cm Hermaphrodite	2 nos.
21.	Chisels cross cut 200 mm X 6mm	2 nos.
22.	Chisel 10 cm flat	2 nos.
23.	Ball Peen Hammer 0.75 Kg	2 nos.
24.	Hammer Mallet	2 nos.
25.	Hammer Plastic	2 nos.
26.	Hammer ball peen 0.25 kg with handle	2 nos.
27.	Work bench 240 x 120 x 75 cm with 4 vices 15cm Jaw	5 nos.
28.	Magnifying glass 75mm	2 nos.
29.	'V' Block 75 x 38 mm pair with Clamps (Hardened and ground) as per IS2949	2 nos.
30.	C Clamps 100mm	2 nos.
31.	C Clamps 150mm	2 nos.
32.	C Clamps 200mm	2 nos.
33.	Spanner, adjustable upto15cm.	2 nos.
34.	Spark plug spanner 14mm x 18mm x Size	2 nos.
35.	Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with box	2 nos.
36.	Pipe wrench 350 mm	2 nos.
37.	Spanner T. flex for screwing up and up-screwing inaccessible	2 nos.
38.	Spanner Clyburn 15 cm	1 no.
39.	Magneto spanner set with 8 spanners	1 set
40.	Piston ring filing jig	2 nos.
41.	Cylinder ridge cutter	1 no.
42.	Vice grip pliers	10 nos
43.	Circlip pliers Expanding and contracting type 15cm and 20cm each	10 nos
44.	Torque wrenches 5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
45.	pneumatic tools set	1 no.
46.	Car Jet washer	1 no.
47.	Pipe flaring tool	1 no.
48.	Pipe cutting tool	1 no.
49.	Universal puller for removing pulleys, bearings	1 no.
50.	Cleaning tray 45x30 cm.	4 nos.

51.	Cleaning tray- Aluminium 45 x 30 cm	4 nos.
52.	Stud extractor set of 3	2 sets
53.	Stud remover with socket handle	1 no.
54.	Paraffin pressure Gun	2 nos.
55.	Grease Gun	2 nos.
56.	Hacksaw frame adjustable 20-30 cm	4 nos.
57.	Files assorted sizes and types including safe edge file (20 Nos)	2 set
58.	Drill twist,metric straight shank 3 mm to 12 mm in step of 0.5 mm	1 set
59.	Drill point angle gauge	1 no.
60.	Set of stock and dies - UNC, UNF and metric	2 sets each
61.	Taps and wrenches - UNC, UNF and metric	2 sets each
62.	Taps and Dies complete sets (5 types)	1 set each
63.	Hand reamers adjustable 10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2sets each
64.	Lapping abrasives (consumable)	As required
65.	Oil can 0.5/0.25 litter capacity	2 nos.
66.	Oil Stone 15 cm x 5 cm x 2.5 cm CONSUMABLE	1 no.
67.	Straight edge gauge 2 ft.	1 no.
68.	Straight edge gauge 4 ft.	1 no.
69.	Thread pitch gauge metric, BSX, BSF, MC, MF & SAE	1 each
70.	Ladle 150mm Dia	1 no.
71.	Blow Lamp 1 litre	2 nos.
72.	Crow bar 910 x25mm	2 nos.
73.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts	2 each
74.	Wire Gauge (metric)	5 nos.
75.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm	2 nos.
76.	Hand rubber gloves tested for 5000 V CONSUMABLES	5 pair
77.	Digital Multi meter range of 0-500v AC/DC, 0-10A AC/DC, 3½ Digit(min),Diode test mode and continuity mode, accuracy ±0.01%	5 nos.
78.	Growler	1 no.
79.	Hydrometer (CONSUMABLE)	10 nos.
80.	battery analyzer with printer	1nos
81.	Carburettor – Solex, Mikuny for dismantling and assembling	1 each
82.	Philips allen key set	1 set



83.	Starter motor axial type, pre-engagement type & Co-axial type	(3each)
84.	Distributor –Duel advance type, reluctance type	3 each
85.	Tester sparking plug ‘NEON’ Type	1 no.
86.	Alternator assembly used for LMV	2 nos.
87.	Starter motor assembly used for LMV	2 nos.
88.	Electronic engine control module	1 no.
89.	Fuel feed pump	2 no.
90.	Fuel pump for MPFI	2 no.
91.	Inline fuel injection pump and rotor type fuel injection pump	2no.each
92.	Petrol nozzle	8 nos.
93.	Drift copper 10 mm dia x 150 mm	2 nos.
94.	Piston ring compressor	4 nos.
95.	Piston ring expander	1 no.
96.	Valve spring compressor	1 no.
97.	Valve seat cutter complete set with guide and pilot bar (all angle in a head)	1 set
98.	Timing light	1 no.
99.	Tachometer digital	1 no.
100.	Battery 12V (Lead acid & Alkaline )	4 nos.
101.	Electrical horn ( different types )	2 sets
102.	AC alternator slip ring puller	1 no.
103.	Executive Auto Electrical tool kit	2 nos.
104.	Magnetic stick	1 no
105.	Piston ring groove cleaner	1 no
106.	Oil filter wrench adjustable	1 no
107.	Looking glass	1 no
108	Coil spring compressor for suspension spring	1no.
109	Turbo charger , variable Turbo charger	1 each
110	Timing Light with tachometer	1 no.
111	Battery Tester 12V	1 no.
112	Spark Plug spanner	1 no.
113	Sparkplug gap gauge	1 no.
114	Ambient temp. gauge	1 no.
115	Working model of wiper along with wind shield	1 no
116	Wiper motor assembly	1 no
117	Car stereo	1 no
	<b>GENERAL INSTLLATIONS/MACHINERES FOR 1<sup>ST</sup> SEMESTER</b>	

1.	Demonstration board of 2Wheeler Ignition system.	1 no.
2.	Demonstration board of electronic Ignition system. 4W	1 no.
3.	Spark Plug cleaning and testing equipment	1 no.
4.	Working Condition of Petrol MPFI Engine Assembly with fault simulation board	2 nos.
5.	MPFI petrol engine with swiveling stand along with special tools for dismantling and assembling	2 nos.
6.	Demonstration board of MPFI system	1 no.
7.	Ultrasonic Injection cleaning equipment	1 no.
8.	Working Model of power windows	2 nos.
9.	Petrol Engine(2-stroke) Motor Cycle/Scooter along with special tools and accessories	2 nos.
10.	Cut model of 4 stroke Petrol engine on stand	1 no.
11.	Cut model of 2 stroke Petrol engine on stand	1 no.
12.	Mechanical Hoist/Plate Form Type	1 no.
13.	Multi scan tool /ECU diagnostics kit	1 no.
14.	Four stroke multi cylinder diesel engine in working condition	4 nos.
15.	Four stroke four cylinder CRDI diesel engine in working condition	2 nos.
16.	Functional/experiment model of different type of sensors.	1 set
17.	Auto Electrical test bench	2 nos.
18.	Cut section Model of Mock layout of a motor car –electrical system – working model	1 set
19.	Battery charger 6 – 72 v for charging with cut off circuit	1 no.
20.	Trolley type portable air compressor single cylinder with 45 liters capacity Air tank, along with accessories & with working pressure 6.5	1 no.
21.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth	1 no.
22.	Portable electric drill Machine	1 no.
23.	Spring tension tester	1 no.
24.	Valve refacing machine	1 no.
25.	Injector testing machine for diesel	1 no.
26.	Smoke meter for Diesel with camera and printer	1 no.
27.	Exhaust gas analyser with camera and printer	1 no.
28.	Connecting rod alignment fixture	1 no.
29.	engine lifting crane (jib)	1 NO
30.	Oil draining trolley	1 no
31.	Engine cranker 12v/24v,upto 500 amps to start engine	1 no
32.	Stretcher trolley for under chassis working	1 no

GENERAL INSTLLATIONS/MACHINERES 2 <sup>ND</sup> SEMESTER		
1.	Cut section working model of Single plate clutch assembly.	2 nos.
2.	Cut section working model of Diaphragm clutch assembly.	2 nos.
3.	Cut section working model of centrifugal clutch assembly.	2 nos.
4.	Front axle ( Rezeppa Joint) with stand for Dismantling and assembly	2 nos.
5.	Rear axle with stand for Dismantling and assembly	2 nos.
6.	Constant Mesh Gear box with stand for Dismantling and assembly.	2 nos.
7.	Sliding mesh Gear box with stand for Dismantling and assembly.	2 nos.
8.	Synchronous Gear box with stand for Dismantling and assembly.	2 nos.
9.	Transfer case with stand for Dismantling and assembly.	2 nos.
10.	Cut section model of synchronous gear box working	1no.
11.	Cut section model of sliding mesh gearbox working	1no.
12.	Cut section model of constant mesh gearbox working	1no.
13.	Full floating axle and semi-floating axle assembly	2 nos.
14.	Cut section working model of automatic transmission Gear box	1no.
15.	Working model of fluid fly wheel	1no.
16.	Working model of torque converter	1no.
17.	Steering assembly - 1.Rack & pinion, 2.Worm & roller 3. Recirculating ball 4.Power steering	2 each
18.	Cut section models of shock absorbers	1no.
19.	Stock absorber testing bench	1no.
20.	Wheel alignment setup instrument-computerised	1no.
21.	Tyre changer	1no.
22.	Nitrogen Tyre Inflation system	1no.
23.	Tube vulcanizing machine	1no.
24.	Wheel balancing machine with accessory	1no.
25.	Tubed tyre of car, trucks & motorcycle	1no.
26.	Tubeless tyre of car & truck	1no.
27.	Cut section of cross ply and radial tyres	1no.
28.	Working models of Disk brake with caliper assembly	2 nos.
29.	Drum brake assembly	1no.
30.	Tandem master cylinder with booster	4 nos.
31.	Wheel cylinder	4 nos.
32.	Vacuum assisted hydraulics brake assembly along with vacuum booster and Front Disk brake assembly and Rear side Drum brake assembly	1no.
33.	Working model of Air Brake Assembly	1no.
34.	Brake testing equipment (to test efficiency of vehicle where motion after braking is plotted)	1no.
35.	Motor vehicle in running condition (Diesel heavy) with hydraulic power steering	1no.
36.	Light Motor Vehicle Diesel CRDIwith electronic power steering and car a/c	1no.
37.	Mechanical Hoist/Plate Form Type	1no.
38.	Trolley type portable air compressor single cylinder with 45 liters capacity Air tank, along with accessories & with working pressure 6.5 kg/sq cm	1no.
39.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia	1no.

	wheels rough and smooth	
40.	Portable electric drill Machine	1no.
41.	Spring tension tester	1no.
42.	Multi scan Tool / ECU Diagnostic kit	1no.
43.	Engine Dynamometer	1no.
44.	Four stroke multi cylinder engine MPFI petrol with CNG kit set up in running condition	1no.
45.	LPG conversion kit along with tank fitted on a stand	1no.
46.	Car A.C unit working model of car A/C unit with charging unit with Engine	1no.
47.	Single cylinder four stroke stationary diesel engine	2 nos.
48.	Bench drilling machine	1no.
49.	Battery charger	1no.
50.	brake bleeding machine	1no
51.	a/c gas refilling m/c	1no
52.	crdi service tool kit	1 set
53.	A light motor vehicle petrol & LPG driven	1 no
54.	HYDRAULIC PRESS	1no
55.	A light motor vehicle CNG driven	1no
56.	Induction stove – 230 V	01 No.
57.	Beaker (consumable)	01 No.
58.	Thermometer. Range Max 150 deg C	01 No.

**FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR  
THE MODULES TT-I AND TT-II (COMMON FOR ALL ENGG. TRADES)**

01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10 nos.
02	Class Room Tables ( 3ft X 2ft) / Dual desk may also be allowed	20 /10 nos.
03	Chair for Trainer (armed) movable	1no.
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	1no.
05	LCD / LED Projector	1no.
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	1no.
08	White Board (6ft X 4 ft.)	1no.
09	LCD Projector Screen	1no.
10	Air Conditioner 1.5Ton (OPTIONAL)	02 nos.
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Laser Printer with scanner	01 no
14	Steel Cupboard with 8 pigeon lockers	3 nos.
15	Work bench for fitters with two vices of 100mm	2 nos.
16	Steel cupboard 180x90x45cm	2 nos.
17	Steel cupboard 120x60x45cm	2 nos.
18	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool capacity	04 nos.

19	First aid box.	1no.
20	Vacuum Cleaner	01 No.

LIST OF FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR  
AUDIO VISUAL LAB (COMMON FOR ALL ENGG. TRADES)

01	Class Room Chairs (armless) / Dual desk may also be allowed	30 /15 nos.
02	Class Room Tables ( 3ft X 2ft) / Dual desk may also be allowed	30 /15 nos.
03	Chair for Trainer (armed) movable	01no.
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01no.
05	LCD Projector	01no.
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01no.
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	01 no.
10	Air Conditioner 1.5Ton (OPTIONAL)	02nos.
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Document Camra / Visualiser	01no.
14	Smart Board / Inter Active Board	01no.
15	Over Head Projector	01no.
16	Video Camera with stand	01no.
17	Printer cum Scanner	01no.